

# Colour and Light

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## Lighting Decisions To be Made

- **Where Does the Light Come From?** Some of the lighting types below can give you ideas about the positioning of the light.
- **Are we dealing with soft or harsh lighting?** Soft (or Diffused) lighting is not concentrated on one spot and will create a soft transition from highlight to mid tone to shadow. Harsh lighting will create heavier shadows with little or no gradient.
- **What Colour is the Light?** Is it a warm or cool light? If it is a harsh light, the colour of the light will be VERY prominent in the highlighted areas.

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## The Basics.

- **Find your light source** - Usually the penciller/inker will determine this - look for shading on the the panel - or even where the thicker line work is. If the thicker lifework is on the bottom side of a character, that would indicate the scene is top-lit.
- **Be constant** - and good trick is to add a layer with bright coloured arrows indicating your light direction.
- Highlights will be brightest at the point closet to the light source.
- Small and bright light sources cast hard edged shadows.
- Large and soft light sources cast softer shadows.
- Creating light sources of an opposite colour to your main subject helps create good pop.
- If multiple light sources, make one hard, and one soft. The hard light will make brighter, sharper highlights, while soft light will be softer. Be very consistent with light sources.

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## Coloured Light

- The human brain tends to filter out light colour when we are under them (unless it is a VERY strong light.) This is why when we look at illuminated windows from the outside, they appear very yellow or orange, but when we are under them, they don't make everything look yellow.
- Something similar happens when we sit in shade, the light is actually very blue (due to the sky's influence) but when we are in it, the light seems neutral.



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## Natural Lighting Types

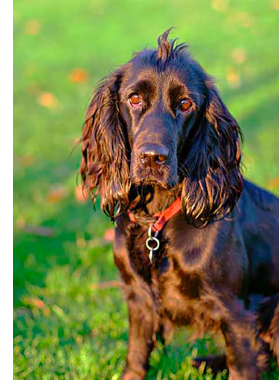
- **Mid-Morning and Mid-Afternoon Sunshine**
  - The main and brightest source of light will be the sun. It is illuminating from a small light source, so cast shadows will have a sharp edge to them. Natural sunlight is usually white in colour.
  - The second source of light is the sky its self. This is a very large light source, so it will create shadows with a very, very soft edge - that may even be totally over powered by the sun's light.
  - There will also usually be a bounced light source.
  - Shadows cast in day light will normally contain a lot of blue because they are illuminated by the blue skylight and is shielding the white light from the sun.
  - Reflected light will be soft light or similar colour tot he sky.
- **Midday Sunshine (Direct Sunlight)**

- The sun will be at its highest point and at its brightest.
- Contrast will be very high and shadows very hard and dark.
- Many colours will appear bleached out and light.



#### • Late Afternoon and Early Evening

- As the sun goes down, natural light will get progressively warmer. So by evening sunlight will have a very obvious yellow to it.
- The colour of the sky will take a deeper blue due to decreasing light levels.
- This time of day looks to have a lot of warmer colours and softer contrast.
- Colour saturation at this time is very high, and the colour of the light gives everything it touches a very warm tone. Shadows will be near the complimentary of the light (Blues)



#### • Sunset Sunshine

- Longer wave lengths of light, such as red, can travel further through the atmosphere without being scattered. This is why sunsets are red/deep orange. The light at sunset has to travel through more light to reach us.
- Light has become very weak and the contrast will be very low.
- Shadows at sunset are very long and texture is very apparent. Some shadows will take on a purple or pink hue.
- Clouds at sunset will be lit from below, giving them an orange hue.



#### • Dusk

- Since the sun is no longer visible, the Sky is the only source of light. Light is very soft with little shadow and contrast and colours can be very delicate.
- After sunset on a clear day there will be an area of pink in the eastern sky. This is called the Alpenglow and can cast a pink light onto surfaces that are reflective. The pink light is too soft to affect darker surfaces such as foliage, so the land can look very dark at this time of day.
- From indoors the sky can look a very deep and vivid blue at dusk, especially as it contrasts with the orange tungsten lighting found in household lamps.
- On an overcast day the skylight is always blue and it is generally much darker with night falling much sooner.



#### • Open Shade

- Open shade is when the sky becomes the main source of illumination. As a result the light has a strong blue cast.
- The light from the sky will be very soft with diffuse light.
- Light can also be reflected from the environment. Colours will bounce off various objects to make different coloured light. For example, if you stand in a forest where the sky is hidden, the reflecting light colour will be green.



- **Overcast**

- Overcast light comes in a few varieties depending on the thickness of the cloud and the time of day.
- The light will be soft and diffuse, with very soft shadows. Contrast is low and colour saturation is usually high.
- This allows you to paint objects in their true colours without the contrasts of light and shade.
- Without sharp shadows complicating composition, a picture will be simpler and shapes bigger.
- Colour will appear brighter and purer than in direct sunlight.
- Overcast light does not change much at different time of day.
- The colour of the light will depend on the time of day, usually it will be blue, and the thicker the cloud cover, the deeper the blue. When the sun is high, the light will be white or grey, the thicker the cloud, the whiter the light.
- The sky will look fairly solid and grey on Overcast days.



- **Bright Overcast**

- On days when cloud cover is thinner, it is possible to get a little directional sunlight shining through, which will create stronger shadows which can still be soft if the light is in front of the sun.
- Light over cast days will usually have a lot of texture in the sky. There can also be blue skylight and yellow sunlight reflecting in the sky.
- Distant clouds will appear yellowish or even orange because of light scattering, even at midday.



- **Sky holes, Foliage, Broken Cloud, Light Storms or Dappled Light**

- With broken cloud you will get clouds casting visible shadows on objects on the landscape, and there will be patches of sunlight between the shadows.
- Contrast can be high and grey skies can be a dramatic backdrop to surfaces in sunshine.
- Skies in this light can be very colourful with a lot of influencing factors. Time of day, thickness of cloud, gaps in the clouds, distance etc. Colours can vary from blue through to yellow, oranges and greys.
- Dappled light is such that is found under trees in the sunshine.



- **Night**

- Although the sun is no longer in the sky at night, the sky generally has some light in it.
- Light might come from sunlight being scattered through the atmosphere, or moonlight. Stars are too faint to cast any noticeable light.
- The key point to remember when colouring a night sky is that it will always be lighter than the land, unless there is an artificial light on the landscape.
- If the moon is visible, it is important to remember that the moonlight is just reflected sunlight and obeys the same rules as the sunlight does.
- When the moon is near the horizon it has a red or yellow colour, and as it gets higher it becomes whiter.
- Light from the sky will be very diffuse and soft. However



moonlight will be hard, just like the sun. The main difference to sunlight will be that it is obviously much fainter.

- Another factor to consider in night scenes is light pollution. Cities will cast an orange glow in the sky, with light reflecting off the clouds.
- Modern nights cape artificial lighting can be incandescent, fluorescent, neon, mercury, vapour, sodium, arc, metal halide and LED, meaning almost any colour in the spectrum can be seen as a light at night.

## Artificial and Indoor Light

### • Window Light

- This light is often very soft and diffused. (Because the window is a large light source.)
- If there is only one window, the contrast can be quite high despite it's soft light source. Multiple windows lower the contrast because there is more fill light.
- The colour of this light can depend on a few factors. Weather can affect it - for example, overcast light can be grey, white or blue. Sunny conditions will create white, yellow or red light. Once the light comes through the window, the surfaces it reflects off can also affect the colour or light, and finally there is the colour of the window it's self. Green glass would produce a green light.
- Assuming the light sining through the window is not direct sunlight, the colour of light that comes through a window is usually blueish. This cool light will contrast with the usually orange artificial indoor lighting (tungsten lighting)
- On a sunny day there will often be a second light source form the direct sunlight hitting the ground and bouncing upwards. This light is best seen on a white ceiling, and is often green or orange in colour, depending on the colour of the ground surface.



### • Household Tungsten Lighting

- This is common household lighting. It can be an overhead, ceiling light or a lamp.
- Tungsten lighting is strong yellow/orange because lights are cheap to produce in this colour.
- Using human perception of light as a bench mark, light will be closer to white while in it, but yellow/orange when viewed from the outside of a building.
- Items like lampshades with diffuse the light, while a bare bulb will not be very diffused at all.
- A utility room or garage may be lit by a single, bare bulb, giving a harsh, high contrast light.
- A room where a lot of time is spent may be lit with multiple bulbs using lampshades to produce a diffused, pleasant lighting.
- Having multiple light sources with produce interesting shadows, also lights in one room will spill over into other rooms.
- Household light tend to make warm colours look bright and vibrant, and cooler colours look flatter and dead.



- **Restaurants, shops and other commercially designed interiors**

- As with ordinary household lighting, this kind of lighting is varied and primarily used to create mood.
- Restaurants will normally have low, soft lights in numbers to create atmosphere. There may also be soft, spotlights to put light on flowers in the centre of the table etc. Or even Candles on the tables themselves.
- Bars and Restaurants will normally have a lot of reflective light too.
- Shops generally have different lighting needs. Most shops will have brightly lit strip lights to create a bright and clear environment with the possibility of extra lighting to spotlight certain displays.



- **Fluorescent Lighting**

- Fluorescent lights are used in situations where cost is a factor. Their colour temperature is usually greenish.
- The actual light given off by Fluorescent lights will be a warm-white or a cool-white, and they tend to emphasise yellow-green.
- This kind of light is commonly found in offices, stations, public buildings and anywhere that needs to be lit, cheap.
- Fluorescent lights are usually used in large numbers, creating multiple, overlapping shadows and rectangular highlights. The density of the lights will dictate the brightness, the more lights, the brighter it is.



- **Mixed Lighting**

- Both indoors and outdoors it is possible to see a mixture of natural and artificial light, especially at dusk and at night. This will mean a mixture of colours and intensities, especially since natural light and tungsten lighting will have complementary colours in blue and orange.
- Any object near a window at night will have a mixture of natural and artificial light. It is common outdoors too - for example, objects illuminated by street lights usually have natural light as fill.



- **Candle Light, Fire Light and Lantern Light**

- Light from a flame is even redder than the incandescent light from light bulbs. It is one of the few types of light that our brains cannot compensate for, so we actually perceive it as orange or red.
- The light will typically appear as a strong, warm orange-yellow colour.
- Something to consider with flame is the light is often placed lower than other lighting, creating a strong under-light effect.
- This type of light is often fairly weak and will drop off pretty quickly as objects recede from the flame.
- At night and in low-light conditions is when the effects of fire light are at their most powerful.
- Smoke will often scatter the light, leaving very few deep dark shadows in the vicinity of the light source. Photographs often miss this, making the shadows appear a deep dark black, when they are often warm, almost glowing and have plenty of soft edges.



- **Street Lighting**

- Street lights are normally a deep orange or white in colour (depending on where you live). They will throw a very narrow spectrum, meaning they can't show any other colours. So everything below them will appear monochromatic orange under an orange light, or very desaturated and washed out under a white street light.
- Between street lights objects will cast multiple shadows.
- The pool of light under a street light will usually be fairly small and fade into darkness very quickly, making them high contrast.



## Luminescence

When a flaming object gives off a light it is called incandescence, when a glowing object gives off light it is called Luminescence. This kind of light can come from living and non-living objects.

- **Bioluminescence**

- Organisms that produce light live mostly in the ocean. They include deep sea Fish, Squid, Jellyfish, Octopus, bacteria and algae. This light tends to be a milky-white in appearance.
- Land animals that produce light include fireflies, millipedes, and centipedes. Also some mushrooms can emit a dim light called foxfire.

- **Fluorescence**

- Fluorescence is light produced when an object converts invisible electromagnetic energy, such as ultraviolet radiation, into visible wavelength.

- **Luminescence Tips**

- Luminescent colours often graduate from one hue to another.
- Blue-Green colours are the most common in the ocean because those wavelengths travel the furthest in water.
- Always add your glowing effects last.

## Hidden Light Sources

There are three ways to light a scene, from a light source in the scene, from just outside the scene or from a light source concealed from view in the scene.

- Hidden light sources add a air of mystery to an image.

## The Form Principle

Light striking a geometric solid such as a cube or a sphere, creates an orderly and predictable series of tones. Learning to identify these tones and place them in their proper relationship is one of the keys to achieving a look of solidity.

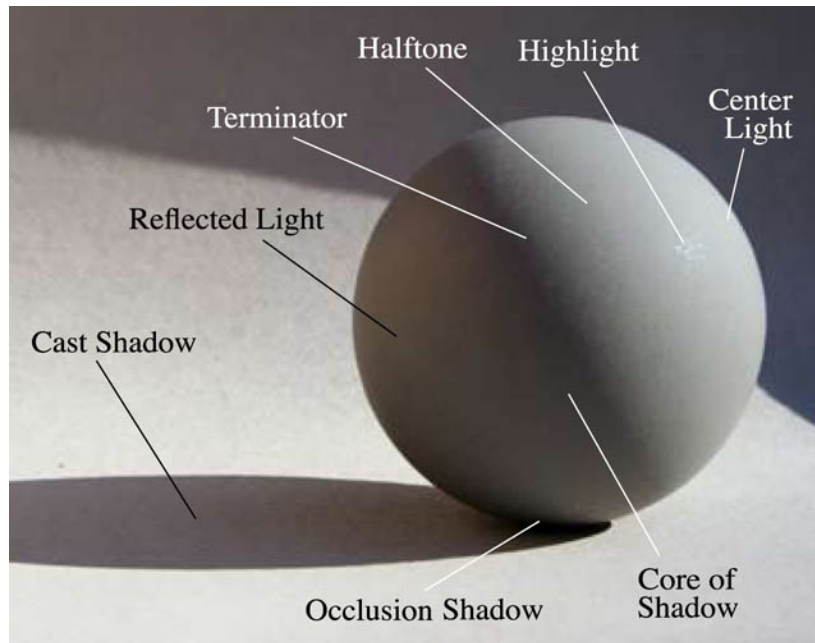
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## Modelling Factors

- In direct light there will be a strong division of light and shade.
- In diffuse light has a softer division of light and shade.
- Solid objects with a matte finish will always behave predictably with transition of light and shadow.
- Items like clouds, foliage, hair etc will vary in how they reflect light, cast shadow etc based on how dense they are. They should be treated on a case by case basis.

## Tones

- **Centre Light** - Centre light is the spot where a directed light is hitting.
- **Highlight** - Highlights are the area directly affected by light. They will usually contain traces of the light colour. It will be the second brightest area (behind the Centre Light)
- **Halftone** - The half tone is the area where texture will stand out the most.
- **Terminator** - or Bedbug line, is the area where the form transitions from light to shadow. It occurs where the light rays from the light source tangent to the edge of the form.
  - If it is a soft, indirect light, the transition from light to shadow at the terminator will be more gradual. The form shadow begins just beyond the terminator.
- **Core of Shade** - Also called the Hump of the shadow, the core is a dark part of shadow just beyond the terminator. The core will only form if the secondary light source (edge light, reflected light or fill light) doesn't overlap with the main light source. Creating this light source can give a form more impact.
- **Occlusion Shadow** - This is the darkest part of shadows and it is usually the points of contact of an object.
  - These are dark accents that occur when two objects are close enough together to crowd out the light, leaving dense, dark shadow. Think where two pieces of material come together, or inside a small crack in rock, or at points of contact with the ground.
- **Reflected Light**
- **Cast Shadow** - Cast shadows are the shaded area caused by a subject intercepting beams of light.
  - On a sunny day, most shadows will be blue because they are reflecting the light coming from the sky.
  - Soft light will cast a shadow with a blurry edge, hard light will cast a shadow with a hard edge. Two side-by-side lights (such as headlights) will cast two side-by-side shadows.
  - The edge of any cast shadow will get softer the further you move away from the object that cast it.
  - Directional Light equals hard shadows (such as low angle sun, or a spot light), indirect light is softer shadows. Distance from object blocking the light can also soften the edge of a shadow. The more powerful the light, the harder the shadow.



## Shadows

- Shadow defines form.
- All objects are made up of various planes. Planes are flat areas either existing or imposed upon round objects.
- Planes facing the light will receive a highlight tone.
- Planes facing at 90 degrees to the light will have a half tone.
- Planes facing opposite the light will have a shadow tone.
- Within a shadow is not darkness, but the effect of other, weaker sources of light.

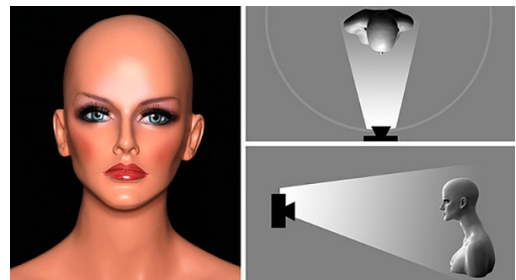
- Outdoors, the blue light from the sky usually modifies the shadow planes, depending on how much they face upwards.
- Reflected light often raises the tone of shadow. It comes from light bouncing up off the ground or other surfaces.
- Half shadows (having half an object in shadow and half out of shadow) is a great way to create drama, especially in a vertical form.
- Form shadows are softer, gradual shadows that define the form of an object.
- The colour of shadow will be the sum of all the sources of reflected illumination
- Cast shadows can be measured from the light source with line past the highest point go the object.

## Lighting Direction

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### Frontal Lighting

- This simply means the light is directly in front of the subject.
- The object will be almost entirely lit.
- It will often mean a “halo” of shadow around the subject.
- This type of lighting does little to reveal texture or detail because most shadows are hidden from view, and as a result, it can make object look flat.
- This is a good lighting type to use when wanting to reveal colour and pattern.
- The planes will get darker as they turn away.



### Side Lighting

- Also called “Split Lighting”
- This is when the light is on either the left or right of the subject at a 90 degree angle.
- This will result in one side of the object being illuminated, the other in shadow.
- The separation of shadow will be split almost down the centre of object (raised planes in the subject notwithstanding).
- This type of lighting is good for showing form and texture, and lends a 3-dimensional appearance to objects.
- It is also excellent for throwing dramatic shadows, which are prominent and contrast can be high as a result.
- It is the kind of lighting encountered at the beginning and end of days and is often used in film and photography.
- One potential draw back is detail can be lost in the shadows.



### Back Lighting

- This is when the light source is directly behind the object.
- It will cause a glow to appear all around the object.
- The light will extend slightly along the insides of an object, leaving the deeper shadows in the middle of the viewing plane.
- Most of the subject should be in shadows with reflected lighting creating detail in the subject.

- The further the subject is from the viewer, the less detail will be visible (and the more in shadow it will be, with a glow around the outside).
- If the light is shifted slightly to one side, it creates a heavier halo on that side of the object.
- This form of lighting can look very atmospheric and dramatic.
- Back lit scenes usually contain a lot of shadow unless the light source is very soft.
- This form of lighting will also reveal transparency as the light shines through objects.



#### • **Contre Jour**

- This is a type of back lighting where the subject blocks the light.
- Often the subject will stand against a very light sky or illuminated background.
- Silhouettes play a strong role in this form of lighting.
- Colours will lose saturation and shadows will stretch forward.
- Glare will spill over the edges of the form, causing details to disappear.

### Dual Lighting

- Dual Lighting is often used when a lot of “impact” or drama is needed.
- The use of two light sources will create a dual core shadow.
- One light source should be dominant either in its luminosity or temperature or both.
- The dominant light is often referred to as “Key Light” while the secondary source is “Fill Light”



### Rim Lighting

- Also referred to as “Edge Lighting” or “Kicker Lighting”.
- This type of lighting requires a strong light source to look its best.
- This effect often happens in nature when the sun is low and shining toward the viewer.
- The light will accent the planes of the object that face back towards the light source.
- This effect can cause a heavenly light around an object, sometimes called “Halation” Light (as in a Halo effect).
- This light source is usually lower than that in back lighting, but it does have a similar look to it.



### Three Quarter Lighting (Broad Light)

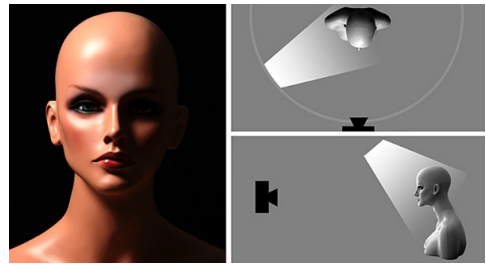
- Also referred to as “Broad Lighting”.
- This is one of the most common types of lighting for fine art and portraits.
- The light’s origin will be about 45 degrees from either the left or right and slightly low.
- It is the type of lighting that causes a triangular shadow from the nose that meets the shadow on the non-illuminated cheek.
- The light will be set low enough to illuminate both eyes.



- This light brightens the nearer (broader) side of the face.

- **Rembrandt Lighting**

- This is putting the light slightly above and at 90 degrees to the side of the subject.
- It creates heavy shadows under and to the non-illuminated side of the subject.

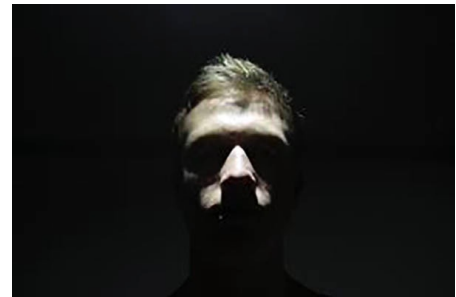


- **Short Lighting**

- This is similar to Broad or Three-Quarter Lighting, but the effect is much more dramatic with heavier shadows
- It is more or less the opposite of Three-Quarter Lighting, where it is the distant or short side of the subject that is illuminated.

## Top Lighting

- Top lighting is fairly natural form of lighting.
- It is very common in overcast daylight and in direct sunlight around midday.
- In a soft light, it is effective at showing form, under a hard light, it can be very dramatic and lend an air of mystery to a scene or subject.
- For example, people under a hard top light will have black holes instead of eyes as they will be completely hidden in deep shadow.



## Under Lighting

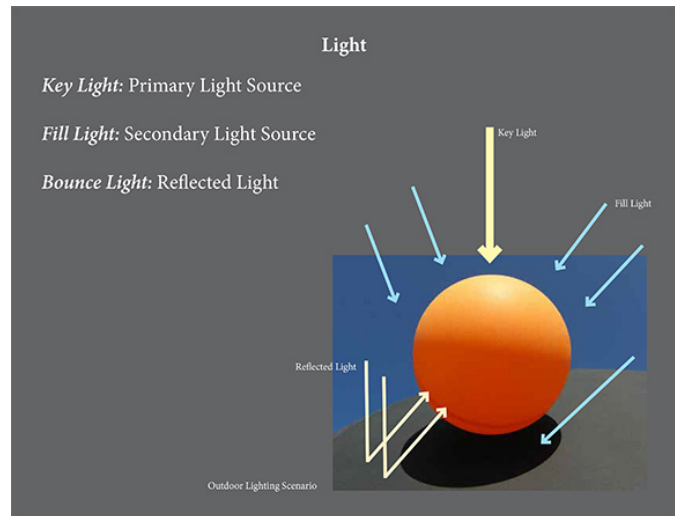
- Also called “Below Lighting”, this is a dramatic form of light that lights from under the object.
- Under-lighting is usually associated with firelight or theatrical lighting, it invokes feeling of the magical, sinister or dramatic often used in Pulp, Horror and Science Fiction.
- This form of lighting does not often happen in nature, unless the subject is standing directly over a light source such as a campfire.
- It is the type of lighting you get when a subject places a torch under their chin.
- This type of lighting will often be strongly coloured. For example the orange of firelight or the blue flicker of a computer screen.
- Not all upward lit scenes suggest evil - somebody relaxing with a sun-flooded book will have their face lit by reflected light, suggesting positive connotations.



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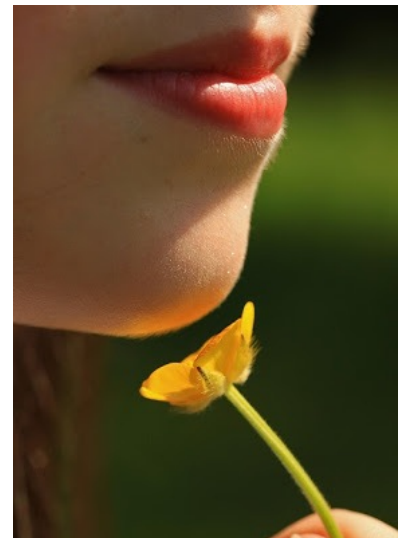
## Bounce, Secondary or Reflective Light Sources

- When light hits an object it either bounces or is absorbed. A white surface will reflect all wavelengths equally, meaning the reflected light will be white.. When white light hits a red surface, blue and green are absorbed and the red light is reflected, meaning the bounce light will be red.. this phenomena is called radiance, and it is usually a very soft light.
- In soft or dimly lit situations, bounce light will not happen at all.
- Can be used to make a character “pop” after rendering a panel
- Pick a bright colour that is very different from your main light source and the background colours. Paint one side of the object in your panel with it.
- Do not go overboard with it - it can very quickly kill a page.
- The darkest shadows on a subject being affected by bounce light will be border between the primary light and the shade.



- **Upward and Downward Facing Planes**

- Most of the time we think of shadow as being blue. This is because surfaces tend to take on a blue hue when they are upward facing - because of the blue light reflecting from the sky.
- Upward facing planes will be blue on a clear, sunny day.
- Downward facing planes are different, they will reflect colour from illuminated surfaces beneath them.
- As a general rule, upward facing planes will be blue, downward facing warm.
- Reflected light falls off very quickly as you get farther from the source, unless the source is VERY large (such as a lawn.)
- The effect is clearest if you remove other sources of reflected light and fill light.
- The colour of shadow will be the sum of all the sources of reflected illumination
- On a sunny day, vertical surfaces in shadow will usually receive two sources of illumination, a cool light from above, and a warm light from below.



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## Spot Lighting

- In theatrical illumination, the light is almost never completely uniform. Less important areas of the stage will be left in darkness and a spot light used to create a focal point.
- Shadows will match the tone of areas outside of the spotlight - because it received the same Ambient light as the rest of the scene.
- A common use of spotlight lighting in early cinema is to create a “eye-light” - so only the eyes are highlighted and the rest of the face is in shadow.

- A spot light can create a feeling of a subject being tracked or followed.



### Butterfly Lighting

- Produced by putting the light above and in front of the subject.
- It will create heavy shadow on lower facing panes.

### Fill Lighting

- Fill Lighting is a weaker secondary source of light
- It is often used to add a tone to shadows.



### Loop Lighting

- Produced by putting the light above and slightly to the side of the subject.
- It will create heavy shadows on the opposite and lower sides of the subject.

### North Lighting

- North lighting is created with the use of a large North facing window.
- This is a slightly diffused light that will create soft cool highlights and warmer shadows.
- It is a very natural, outdoor type of lighting that requires no direct light on the subject.
- The light will most often be blueish, with a green or orange bounce light coming off the ground outside on bright, sunny days.



## Coloured Lighting and Transmitted Lighting

- Coloured lighting works well when you use Analogous or Complementary coloured lights.
- Transmitted light is when direct light shines through a coloured surface - for example a stained glass window. This will create an effect much the same as a coloured light.
- It will create highly saturated colours across skin and other objects.



### • Warm Dominant

- This is when the light source is extremely warm, when using this form of lighting, shadows will become extremely cool.

### • Cool Lighting

- This appears similar to moon light or cool lighting on an overcast, winter's day.
- It will create soft, cool highlights on the planes affected by the light.

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## Underwater Lighting

- **Caustics**

- Caustic is when light shines onto a transparent object and it acts like a lens, focusing the light into spots or lines of light.
- Examples can be light shining through a glass of water, or underwater with the patterns that light makes on objects just under the surface, when the light reflects off the surface ripples.
- Caustic reflections can also be cast upwards from the surface onto solid objects.